Pesticide Contamination of Farm Water Supplies

Recommendations on Avoidance, Clean-up and Responsibilities

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Factsheet

ORDER NO. 10-097 AGDEX 607 DECEMBER 2010
(replaces OMAFRA Factsheet, *Pesticide Contamination of Farm Water Supplies*, Order No. 00-099)

A large volume of water is taken every year from farm wells, ponds, ditches and streams to apply pesticides to crops. From time to time, accidental contamination of the water sources occurs. Contamination of ground or surface waters is an indictable offence under provincial legislation (or statutes) including the *Pesticides Act,* the *Water Resources Act* and the *Environmental Protection Act.* If fish are killed as a result of the contamination, the federal *Fisheries Act* is also violated.

FARM FAMILIES

Make every effort to avoid contaminating any well or surface water supply. One contaminated water source poses a potential threat to adjacent water supplies.

Keep a separate well for drinking purposes only.

MODE OF CONTAMINATION

Direct Contamination

- spillage of pesticide concentrate when mixing and loading sprayers
- leakage of stored concentrate or discarding unrinsed "empty" containers in or near a water supply
- back siphoning or overfilling of sprayer tanks
- rinsing or washing spray equipment
- spray drift under windy conditions or application too close to open water
- vapour drift that moves in the air

Careless Handling of Concentrates

Examples of careless handling:

- pesticides that are stored near water supply areas leaking from corroded containers and contaminating reservoirs, wells and ponds
- dropped or fractured containers spilling pesticide concentrate, leading to serious contamination of private water supplies
- unrinsed empty containers left in or near streams, or in dried-up ditches that later carry runoff waters, contaminating surface water

Filling Spray Rigs

Accidents while filling spray equipment often result in water contaminations that are hazardous to human and livestock health. Residues in well waters can be up to 500 times higher than concentrations caused from spray drift or indirect contaminations. These accidents usually involve back siphoning from spray equipment directly into the well and overfilling tanks, which potentially creates spills in and around the well head. In porous soil, pesticides can leach into the groundwater and contaminate the well. On clay soils, rains can wash the contaminated surface soil into the well. In either case, the well can stay contaminated for a long time.

Pesticide Spray Drift

Usually this type of water contamination results in very low residue concentrations. The greatest danger exists when spraying is carried out close to wells or surface water. Under normal spraying conditions and using low pressure application, drift is carried a minimal distance (at wind speeds less than 11 km/h). **Consult the label for specific instructions on buffer zones and the specified distance between the water source and sprayed areas before applying a pest control product.** Unless specified otherwise in the pesticide label, leave a buffer zone of at least 10 m between all water supply sources and sprayed areas to avoid contamination.

Ministry of Agriculture, Food and Rural Affairs

Ontario

Indirect Contamination

- movement of pesticide from treated land by heavy rains and runoff waters or by soil erosion
- spills that leach to groundwater and move laterally in aquifers

Surface Runoff

Surface runoff is the movement of water over a surface. Surface runoff water can pick up soil particles and pesticides from treated fields or spills, and carry these into streams, ditches, ponds and wells. The greatest effect from surface runoff occurs when rain falls within 24 hours of a pesticide application. However, pesticides can be carried in surface runoff months after application if the pesticides are persistent in the soil.

Runoff is normally more severe on clay soils and less of a problem on sandy soils.

Subsurface Drainage Water

Pesticides that are persistent and water soluble can move through the soil and into the water table.

Most often, the subsurface contaminations are the result of spills of formulated concentrates that reach groundwater. Seepage of such groundwater may reach wells and streams.

WATER QUALITY

Water quality standards for potable water, fish and wildlife, and irrigation waters are available from Health Canada, the Ontario Ministry of the Environment (MOE) and the International Joint Commission.

THE *PESTICIDES ACT* AND REGULATION 63/09

The Ontario Ministry of the Environment administers the *Pesticides Act* and Regulation 63/09. The *Pesticides Act* and Regulation 63/09 contain many references to pesticide contamination of public waters as being an offence in Ontario. For more information, please refer to the *Pesticides Act* and Regulation 63/09:

- Under Section 4 of the Act, no person shall permit the deposition, addition, emission or discharge of a pesticide into the environment that causes: (a) impaired quality; (b) injury or damage to property or plant and animal life; or (c) adverse health or discomfort to any person greater than would necessarily result from the proper use of the pesticide. Under Regulation 63-09, s.12(1) no person shall use water from a well or from a lake, river or other body of surface water in an extermination unless the person takes measures to prevent backflow of pesticides into the water.

  Under Regulation 63/09, s.12(2) no person shall wash any equipment used in an extermination in or near a well or in or near a lake, river or other body of surface water in a manner that causes or may cause a pesticide to be directly or indirectly discharged into the well or into the lake, river or other body of surface water.

IMPACT ON WATER SOURCES

Stream Water

Pesticide contamination can impact the health of a stream affecting both wildlife and people. When the contaminant is a pesticide such as rotenone or endosulfan, highly visible fish kills may result. When a herbicide is involved, the contaminated water may cause problems when used for irrigation, especially in greenhouse production of highly sensitive plants such as tobacco or tomato seedlings. Stream waters are used as potable waters in several communities in Ontario, and contamination can pose a hazard to human health. Water is also drawn from streams for livestock use and can pose a hazard to livestock and the quality of their produce.

Farm Ponds and Wells

Similar effects are observed in farm ponds where fish are killed and crops damaged. When well waters are contaminated, losses of plants in greenhouse production can be particularly severe. The water can also develop off-flavours and become objectionable to drink.

Indirect Contamination

Concentrations of pesticides in water from indirect contaminations are generally low, however, they may continue over an extended period. This is especially the case when below-ground contamination has occurred in an aquifer. Below-ground contamination by certain pesticides can cause problems when the water is used to raise plants in greenhouses.

IN CASE OF A PESTICIDE SPILL

The following guidelines for handling spills supplement, but do not replace, information on the label of the product, the Material Safety Data Sheet (MSDS) and other key agencies.

- Remember to protect yourself first in an emergency situation. Wear adequate personal protective equipment and remove all persons and animals from

the spill area. Exercise extreme caution in entering a contaminated area.

- Isolate the area so that no unauthorized person, animal or vehicle is exposed or contaminated by accidentally walking into or moving through the spill, or is exposed to fumes from the pesticide. Establish a decontamination line around the perimeter such that anyone entering the area must be wearing adequate protective equipment and persons and/or vehicles leaving the spill area can be decontaminated.
- In case of a spill, contain the spread of the pesticide. If possible, stop the continued leaking of a container. Construct a barrier made of soil, sawdust or newspaper to prevent further contamination of the environment.
- Apply the general principles of first aid, such as basic life support procedures. Remove contaminated clothing. Thoroughly wash affected skin areas with soap and water.
- Immediately notify the Spills Action Centre of the Ministry of the Environment by calling 1-800-268-6060. Contact the distributor or registrant of the pesticide product or the emergency response system for dangerous goods — CANUTEC — (Ottawa 613-996-6666 or *666 on a cellular phone).
- Clean up the spill. Pump surplus liquid product into drums. Soak up small amounts of liquids in sawdust, soil or other absorbent, such as activated charcoal and pet litter. For dry powder or a granular product, lightly wet or sprinkle with damp soil or sawdust, then shovel the material into a drum. If the spill occurs on the ground, it may be necessary to dig up the contaminated site and place the soil in drums. Place leaky or damaged containers in a drum or heavy plastic bag. Inside a building, ventilate the area to prevent the build-up of toxic fumes.
- Once the spilt pesticide is cleaned up, it will still be necessary to clean the spill site, since not all pesticides are detoxified by the above procedures. If possible, decontaminate the spill site. If no instructions are provided by the label, after removing the spilt pesticide, place a dike around the spill site to prevent the spread of the decontamination solution. Soak the contaminated area with a mixture of equal parts of bleach and water. Caustic soda or lye in water may be used instead of bleach. Then, without removing the chemicals, spread hydrated lime over the entire area and leave for 1–2 hours. After this period, shovel the material into drums. Repeat the application of bleach in water (1:1 ratio) over the entire area and allow it to stand for a further 30 minutes. Hose down the area with water and a detergent as final clean-up.
- Decontaminate all equipment used in the clean-up, as well as vehicles contaminated by the spill. Follow the same procedures.
- Cover and label drums containing the clean-up material. Labels should read "Pesticide — Poison" and include the PCP Registration number(s), trade name(s) or common name(s). Transport drums using a licensed waste hauler to a disposal site approved by the Ministry of the Environment.
- All workers must take a shower, and change to clean clothing. Wash all clothing, boots, gloves, etc., with soap and water before reuse.

RECOMMENDATIONS

Pesticide Storage

Keep pesticide concentrates away from unauthorized persons. Always keep in original containers with a legible label in a locked storage area. If the original container is damaged, store the pesticide in a replacement container made of a similar material and label the container with the original label or a label that includes the PCP Registration Number, trade name and concentration of the active ingredient in the product. Make sure pesticides storage areas are away from water supplies and above high water flood levels.

Spray Equipment

Anti-backflow devices must be used on all equipment where water is being drawn from surface or well waters. Fill spray tanks and move away from the source of water before adding the pesticide to the spray equipment — a minimum distance of 30 m is recommended. Using nurse tanks for water supplies and automatic metering devices to add the pesticide can greatly reduce the possibility of contamination of water supplies. Never leave a filling or mixing operation unattended.

Spray Operations

Deposition of spray drift into stream water is largely due either to spraying too close to surface waters or spraying when the wind is too strong. Cover wells if spray operations are to be carried out in their vicinity. Do not spray when winds exceed 11 km/hr. When not specified by the pesticide label, a setback distance from wells and surface waters of at least 10 m is recommended.

Runoff Water

Heavy rains leading to runoff waters carry pesticides into streams, ponds and wells. To reduce these pesticide losses from treated fields located along streams and ponds, consider planting across the slope. Buffer zones of 10 m can reduce losses on relatively flat land but help little on sloping land. Incorporating the pesticide into the soil or using a foliar application after crop emergence results in lower losses than when applying to bare soil.

Stream and Farm Ponds

The location and protection of a farm pond is important. If the pond is to be located where surface waters can run off treated fields, reduce contamination by berming, ditching or having a grassed buffer strip between the pond and the treated area.

General recommendations on controlling soil erosion help reduce the loss of pesticides to ditches and streams.

Farm Wells

Protect wells against surface runoff waters by ensuring that the well head is properly constructed, in accordance with Ontario Ministry of the Environment guidelines. This will greatly reduce the risk of contamination. There are no adequate means of preventing contamination from subterranean seepage.

DECONTAMINATION OF WATER SUPPLIES

Streams and Ponds

Little can be done to decontaminate streams or ponds, and only time will effect breakdown of the pesticide. In general, the length of time depends on:

- the pesticide
- the time of year
- the extent of the spill or contamination

Removal of empty containers or contaminated soil can improve the speed of clean-up and is required under the *Pesticides Act*.

Farm Wells

Emptying the well of water, several times, may be adequate to decontaminate the water supply if low amounts of pesticide have entered the well as spray drift. More often, the bottom of the well must be scraped and the sediment removed. Well waters are quite cold and often alkaline. Most pesticides are less soluble under these conditions than in waters at higher temperatures and at a neutral pH. Often the pesticide is spilled down the sides of the well and hence removal must include washing the walls, if stone or cement, or scraping if they are earthen, in order to affect a clean-up. This would be followed by emptying the well frequently over several days, weeks or months and releasing the water at least 30 m from the well.

When the contamination involves a spill around the lip of the well, remove the contaminated surface soil. Where only water is removed from the well, decontamination can take from 6 months to 3 years, and in some cases the well has to be abandoned. Clean-up has been rapid where the well was decontaminated by scraping and removing water. Activated charcoal filters are available for decontaminating water when installed on a drinking water line. These filters have been effectively used in the U.S. and are currently being tested in Ontario. Problems of bacterial infection can occur with these devices.

Where a large quantity of pesticide is spilled close to the well, especially on sandy or gravelly soils, the pesticide may soak deep into the soil and seep into the well in succeeding years during the spring melt or under heavy rainfall conditions. This has occurred with compounds such as dinoseb and amitrole that are highly soluble. Where this has occurred, the well has had to be abandoned. With subterranean contamination, wells cannot be decontaminated and abandonment is the only recourse, which stresses the importance of practising good pesticide management around a well.

DISPOSAL OF EMPTY PESTICIDE CONTAINERS

Never reuse empty pesticide containers.

Metal, Plastic or Glass Containers (Reg. 63/09, s.105)

Using clean water, or an appropriate solvent, triple rinse or jet rinse empty containers made of metal, plastic or glass. Add the rinsings to the sprayer tank. Take the thoroughly rinsed empty containers to a Pesticide Container Recycling Depot or a licensed waste disposal site [Reg. 63/09, s.105]. To locate the closest pesticide recycling depot, call the Ontario Pesticide Education Program at 1-800-652-8573, your local dealer or municipality, or visit the CropLife Canada website at www.croplife.ca (click on CleanFARMS™).

When triple- or jet-rinsing a container is not possible, follow the directions on the pesticide label or contact the Ministry of the Environment for information about how to dispose of the container.

Paper and Cardboard Containers (Reg. 63/09, s.105)

Using clean water, triple rinse or jet rinse (if possible) all empty paper or cardboard containers and dispose of them by:

- burning, (if allowed by municipal bylaws) in circumstances where persons and animals are kept out of any smoke produced and any smoke is directed away from buildings, highways, roads or outdoor areas frequented by the public, or
- taking them to a licensed waste disposal site [Reg. 63/09, s.105]. If you cannot dispose of the rinsed empty containers immediately, ensure the containers are stored in a dry, safe place (e.g., pesticide storage area) until you can dispose of them properly.

SUMMARY

Protect Water Supplies

It is an offence to contaminate surface waters with pesticides.

- Always read the label before you apply any pesticide product.
- Keep concentrates above the floodplain in a locked storage area.
- Triple-rinse and properly dispose of empty pesticide containers.
- Mix concentrates and water 30 m away from any water supply.
- Use appropriate buffer zones and berms to avoid surface water contamination by spray drift or runoff waters.
- Draw drinking water supplies from a separate well.
- Follow the setbacks listed on the pesticide label.
- Do not spray within 10 m of shallow wells or other water supplies.

RESOURCES

For more information on pesticides, see these websites:

- Health Canada
  www.hc-sc.gc.ca
- International Joint Commission
  www.ijc.org
- OMAFRA
  www.ontario.ca/omafra
- Ontario Ministry of the Environment (MOE)
  www.ene.gov.on.ca
- Ontario Pesticide Education Program (Ridgetown College)
  www.opep.ca
- Pest Management Regulatory Agency
  www.pmra-arla.gc.ca

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FOR YOUR NOTES

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POD
ISSN 1198-712X
Également disponible en français
(Commande nº 10-098)